Claim 9 (new). The article of claim 4, wherein the alloy consists essentially of said components.

Claim 10 (new). The article of claim 4, wherein the alloy consists of said components.

Claim 11 (new). The alloy of claim 1, wherein the at least one element is K or Na.

Claim 12 (new). The alloy of claim 1, wherein the at least one element is Ca.

Claim 13 (new). The article of claim 4, wherein the at least one element is K or Na.

Claim 14 (new). The article of claim 4, wherein the at least one element is Ca.

REMARKS

The Official Action of April 23, 2003 has been carefully considered and reconsideration of the application as amended is respectfully requested.

Claims 1-4 have been amended to make changes of a formal nature and, in particular, to recite the Markush group in formal Markush language in accordance with the provisions of MPEP Section 2173.05(h). New claims 5-10 have been added more completely to define the subject matter which Applicants regard as their

invention through use of the transitional phrases "consisting of" and "consisting essentially of". These transitional phrases have well-defined meanings and close the claims to all but trace amounts of additional elements or to additional elements which affect the basic and novel properties of the claimed invention.

The claims stand rejected under 35 USC 103(a) as allegedly being unpatentable over Vernam in view of Brown or in view of Brown and Shahani et al. Applicants respectfully traverse these rejections.

The claimed invention is directed to an alloy combining flowability in liquid state, technological ductility, high strength properties with high fracture toughness, uniform properties in sections of massive semifinished products (>150 mm thick). These properties are achieved by strictly regulating the composition of the recited elements. In this respect, it is noted that any Al based alloy composition of the Al-Zn-Mg-Cu system would always contain the basic components of an aluminum based alloy (or admixture), e.g. Zn, Cu, Mg, Fe, and Si. Attainment of desired alloy properties is secured by controlling the ratio of the components and the addition of other elements that affect alloy properties, which in the case of the claimed invention includes Be and at least one alkali or alkaline earth metal selected from the group consisting of K, Na, and Ca.

This effect on alloy properties is shown in the Example beginning on page 4 of the specification, wherein the claimed alloy is compared with a prior art alloy

containing substantially the same elements shown in the primary reference cited by the Examiner (see Table 1 on page 6 of the specification which describes prior art alloy 1 and claimed alloys 2-9, and compare with Comparison Table submitted herewith which also shows the alloys of the cited references). As shown in Tables 2, 3 and 4 on pages 7 and 8 of the specification, the claimed alloys perform better than the prior art alloy in the evaluations described in the specification at page 4, line 32-page 5, line 19.

The references cited by the Examiner do not provide even a *prima facie* case of obviousness for the invention as claimed for a number of reasons. First, even assuming for the sake of argument that the references were properly combinable, the combination would not arrive at the invention as claimed. This is because the claims require *inter alia* at least one element from the group consisting of K, Na and Ca, whereas none of the cited references shows or suggests the inclusion of such element (see Comparison Table submitted herewith). The primary reference does teach that the addition of at least one of strontium, antimony and calcium would have the effect of refining or modifying intermetallic phases (Vernam et at column 5, lines 29-31), but this falls short of teaching the inclusion of calcium instead of strontium, because the reference, when considered as a whole, teaches the mandatory presence of strontium and thus teaches away from the substitution of calcium or antimony for strontium (see Vernam et al at, for example, column 5, lines 17-41, and the claims). In any event, as next discussed, there is no motivation in the prior art to combine the references in the manner suggested by the Examiner.

As acknowledged by the Examiner, the primary reference cited by the Examiner, Vernam et al, does not teach the presence of Be in the described alloy composition. The Examiner nevertheless contends that it would have been obvious to add Be to the Vernam et al composition in view of Brown. However, Vernam teaches that, with respect to aircraft applications such as wing skins where high fracture toughness is important in sheet and plate, the composition should be limited to the components specified ("the alloy normally **consists of** (the described components)") and other components that are present are considered to be "impurities" in all of the relevant embodiments (see Vernam et al at column 6, line 57-column 7, lines 16-38). Accordingly, the reference would appear to teach away from the intentional inclusion in the described alloys of other elements, such as Be, which are not merely impurities, and thus teaches away from the cited combination of references.

Moreover, Vernam et al teaches that the composition described therein is characterized by a shorter hold time required for soluble components to pass into solid solution and there is nothing in the cited art that would show or suggest how the inclusion of additional elements, such as Be, would affect this property of the Vernam et al composition. In the absence of such teaching, those of skill in the art would be motivated not to add elements that are not described in the reference, such as Be, since these might negatively affect the hold time of the Vernam et al composition.

As distinct from Vernam et al, the claimed alloy contains Be which in combination with at least one element of the group K, Ca, Na results in considerably

improved founding properties (flowability in liquid state), contributes to enhancing a degree of purity of the alloy from dissolved H_2 and appreciably increases the technological ductility of alloy ingots of large dimensions. The alloy enhanced fluidity permits use, in casting, filters with a smaller cell size, which additionally purifies the alloy from non-metallic inclusions and oxides. Moreover, Applicants have established that Be neutralizes embrittlement effects from the presence of iron in alloys of the Al-Zn-Mg-Cu system and provides for enhanced ductility and fracture toughness. And a preferable effect is manifest in a ratio of Si:Be≥2. Applicant respectfully call to the Examiner's attention that this ratio is not shown or suggested in Vernam and, therefore, claim 3 of the claimed invention is additionally unobvious over the reference for this reason as well.

Even assuming for the sake of argument that Vernam et al did not teach away from a combination with the secondary references, there would have been no motivation, absent the hindsight provided by the present specification, for one of skill in the art to pick and choose from among the vast number of possible alloys that can be formed from the components of the cited references to arrive at the claimed alloy. Thus, Vernam et al describe broad ranges of such basic alloy components as Zn, Mg, and Cu, whereas other components are only optional and need not be present at all and, if present, need not be present within the claimed range (see Comparison Table submitted herewith). Accordingly, one must pick and choose from among the components and the ranges of components in the references to arrive at the claimed invention. So, for example, the alloys described in Vernam et al at column 6, lines

60-65 and column 6, line 67-column 7, line 4; do not contain Zn within the claimed range. The alloy described at column 7, lines 18-22 contains Cr outside of the claimed range. None of the described alloys contains Be or the recited alkali or alkaline earth metal at all and, even assuming for the sake of argument that there would have been some motivation to include them as opposed to other components described in the secondary references, there would be nothing to suggest including them in an amount such that all of the resultant components would be present within the claimed ranges.

Accordingly, although the percentage of certain individual components described in Vernam et al might overlap with a recited percentage of a component in the claimed invention, and even assuming for the sake of argument that there would have been a motivation to include Be and the recited alkali metal or alkaline earth metal in the Vernam et al alloys, one of skill in the art would still have to pick and choose from among a vast number of components and ranges of components to arrive at the claimed invention. Under these circumstances, the references cannot be considered to set forth even a *prima facie* case of obviousness for the invention as claimed (see *In re Baird*, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994)).

As shown by the Example in the specification as filed, a difference in components in the claimed alloy from the prior art alloy results in a difference in properties. In the claimed invention, an alloy comprising a Be balanced composition, including at least one of the elements of the group K, Na and Ca, provides for a more

effective degassing of the alloy from H_2 and an enhanced fluidity of a melt, which improves a possibility of melt filtration and raises the degree of purity as to H impurity and non-metallic inclusions. The claimed alloy composition also contributes to obtaining a reduced volume fraction of intermetallic compound inclusions, a factor that leads to a substantial increase in fracture toughness. None of these advantages is described or suggested in the cited art.

In view of the above, the invention as defined by all claims as amended is believed patentably to distinguish over the cited art. Claims 5-10 are additionally distinguishable over the cited art in that they use a transitional phrase that closes or partly closes the claims to additional elements, such as Sr, that the primary reference teaches is essential and that would materially alter the basic and novel properties of the claimed invention.

Accordingly, all claims as amended are believed to be in allowable form. An early notice of allowance is earnestly solicited and is believed to be fully warranted.

Respectfully submitted,

CLIFFORD J. MASS
LADAS & PARRY
26 WEST 61ST STREET
NEW YORK, NEW YORK 10023
REG. NO.30,086(212)708-1890

MARKED UP COPY

Claim 1 (amended) High strength alloy of aluminum-zinc-magnesium-copper system comprising the following components (in mass. %):

Zn	6.35-8.0	Si	0.01-0.2
Mg	0.5-2.5	Fe	0.06-0.25
Cu	0.8-1.3	Zr	0.07-0.2
Cr	0.001-0.05	Ti	0.03-0.1
Mn	0.001-0.1	Be	0.0001-0.05

and at least one element selected from the group [[of alkali-earth metals]] consisting of:

K	0.0001-0.01,
Na	0.0001-0.01 and
Ca	0.0001-0.01; and

Al-balance.

Claim 2 (amended) High strength aluminum-based alloy of claim 1, [[characterized in that]] wherein the sum $Zr+2Ti \leq 0.3\%$.

Claim 3 (amended) High strength aluminum-based alloy of claim 1, [[characterized in that]] wherein the ratio $Si:Be \geq 2$.

Claim 4 (amended) [[The]] An article made of [[the]] a high strength aluminum-based

alloy, [[characterized in that]] said alloy comprising the following components [[has the following composition]] (mass.%)

Zn	6.35-8.0	Si	0.01-0.2
Mg	0.5-2.5	Fe	0.06-0.25
Cu	0.8-1.3	Zr	0.07-0.2
Cr	0.001-0.05	Ti	0.03-0.1
Mn	0.001-0.1	Be	0.0001-0.05

and at least one element selected from the group [[of alkali-earth metals]] consisting of:

K	0.0001-0.01,
Na	0.0001-0.01 and
Ca	0.0001-0.01; and

Al-balance.

Comparison table of claimed and opposed alloys

Nos	Components	Chemical composition, wt			
		Claimed composition	US Patent 4 711 762 Patent formula (1-4) /Vernam/	US Patent 4 832 758 (Brown)	US Patent 6 027 582 (Shahani)
1	Zn	6.35-8.0	3.6-8.2	4.0-8.0	5.7-8.7
2	Mg	0.5-2.5	0.1-4.0	1.5-3.5	1.7-2.5
3	Cu	0.8-1.3	0-2.6	1.0-2.5	1.2-2.2
4	Fe	0.06-0.25	Max 0.8	Max 0.5	0.07-0.14
5	Si	0.01-0.20	Max 0.8	Max 0.4	Max 0.11
6	Zr	0.01-0.20	Max 0.8	0.05-0.3	0.05-0.15
7	Mn	0.001-0.10	Max 0.8	0.1-0.5	Max 0.02
8	Cr	0.001-0.05	Max 0.8	0.05-0.3	Max 0.02
9	Ti	0.03-0.10	Max 0.8	-	-
10	Be	0.0001-0.05	-	-	-
11	at least one element of the group: K, Na, Ca	0.0001-0.01	-	-	-
12	Sr (Sb, Ca)	-	0.005-0.5	-	-
13	other conditions	Si:Be≥2 Zr + 2Ti≤ 0.3		Specification: alloy 7075 may contain 0.001-0.005% Be and 0.2% Ti	Cu+Mg<4.1 Mg> Cu
14	Al	Balance	Balance	Balance	Balance